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AUTHOR Hample, Dale
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ABSTRACT

The distinction between inductive and deductive forms of argument, as proposed by G. W. Ziegelmueller and C. A. Dause, is the focus of this paper. The first part of the paper reviews several grounds for distinguishing induction from deduction and explains that neither the traditional distinctions--those based on particular or universal premises, or probable versus certain conclusions--nor a more recent effort that depends on semantic clues unequivocally distinguishes induction from deduction. The paper then summarizes the theory of Ziegelmueller and Dause, criticizes it, and concludes that their definitions are unsatisfactory. The last part of the paper considers the following approaches open to the study of argument if it is not possible to distinguish induction from deduction: (1) to eliminate the supposed distinction and treat all arguments as deductive; (2) to abandon the terms induction and deduction and proceed to some theory of argument that does not depend on them; (3) to move away from normative models and use empirical descriptions of arguments; and (4) to try to rescue the induction/deduction distinction. (EL)

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RECONSIDERING THE DISTINCTION BETWEEN INDUCTION AND DEDUCTION

By

Dale Hample

Western Illinois University

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RECONSIDERING THE DISTINCTION BETWEEN INDUCTION AND DEDUCTION

Abstract

A number of modern scholars have generated theories of argumentation which have little or nothing to do with induction and deduction, once the mainstays of argumentation theory. One recent treatment, that of Ziegelmueller and Dause (1975), has continued tradition by basing its argumentation theory on a distinction between induction and deduction. The chief purpose of this paper to critique that distinction, which is somewhat innovative. Previous failed distinctions are reviewed, the Ziegelmueller and Dause treatment is summarized, and a critique of their analysis is offered. The essay concludes that their distinction, in company with all the others, fails to provide an unequivocal way of telling induction from deduction. The paper ends with some recommendations.

RECONSIDERING THE DISTINCTION BETWEEN INDUCTION AND DEDUCTION

Until recently, the customary way to teach argumentation was to identify two main argument forms--induction and deduction--and give examples of each type (analogy, argument from definition, and so forth). The past few years have seen a number of departures from this practice, however (see Willard, 1980, p. 134). Among those writers who seem to have no special need for the induction/deduction distinction are Toulmin (1958), Perelman and Olbrechts-Tyteca (1969), van Eemeren and Grootendorst (1983a) and Willard (1980). Two of the leaders of the emerging field of informal logic, in fact, see the "partial abandonment of the deductive-inductive dichotomy" as one of the early themes of that movement (Johnson & Blair, 1980, p. 22).

This does not prove anything more than that interesting alternatives to the induction/deduction pair exist, of course. The history of rhetoric is full of complaints about the merit of the syllogism (e.g., Campbell, I.6; Mill, II.3). And induction, in its rhetorical incarnation as the example, has come in for its share of critical analyses as well (e.g., Hauser, 1968; Benoit, 1980). Thus, today's reservations about induction and deduction are fully precedented, and may finally make no more headway than past centuries' criticisms. The critics, indeed, may well be in the minority: the number of scholars working constructively with logic, enthymeme, and related topics is nearly beyond numbering.

The purpose of this paper is to reconsider the various distinctions which have been made between induction and deduction. Many of these are almost completely discredited by now, however, and it would serve little useful purpose to focus on them. Instead, therefore, I will concentrate on

Ziegelmueller and Dause' (1975) treatment. These authors make full and productive use of the induction/deduction pair, but undergird it with a theoretical explanation which attempts to avoid the old traps. I will maintain, however, that in spite of their efforts, they are in the end no more successful than their predecessors.

The first part of this essay reviews several grounds for distinguishing induction from deduction; these criteria are not all explicitly used by Ziegelmueller and Dause, but they turn out to be useful background. The following part summarizes Ziegelmueller and Dause (1975) on induction and deduction. This is followed by my critiques of their analysis. The concluding section offers several recommendations.

Distinctions Which Fail

In an effort to clear the way for discussion of Ziegelmueller and Dause' effort to break new ground in the matter of induction versus deduction, let me briefly discuss several failed approaches to the distinction. This discussion is necessary for two reasons: first, to show why Ziegelmueller and Dause were motivated to innovate in this matter, and second, because some of these deficient distinctions seem to have crept back uninvited into Ziegelmueller and Dause' treatment. Specifically, I will discuss three possible grounds for telling induction from deduction: particulars-to-universals versus universals-to-particulars, probable versus certain conclusions, and semantic indicators.

Perhaps the hoariest, and most easily refuted, claim is that induction proceeds from particular premises to a universal conclusion, while deduction works from universal premises to a particular conclusion. While these two

descriptions may often be correct, they do not suffice definitionally because counter-examples are simple to produce.[1] Ziegelmueller and Dause (1975, p. 88) for instance, produce an induction which moves from particulars to particular: fifty cows are found to give milk, from which it is concluded that a fifty-first cow will as well. Furthermore, here is a deduction which ends in a universal: "all religions have one or more gods; all systems having one or more gods have an ethic; so all religions have an ethic." That this distinction does not work is commonly observed (e.g., Cohen & Nagel, 1934, p. 273; Copi, 1972, pp. 24-25; Ziegelmueller and Dause, 1975, pp. 88, 90).

A second distinction which is easily dismissed is the claim that induction produces probable conclusions, while those of deduction are certain. In the first place, a perfect induction--one which enumerates all the possible instances--does generate a certain conclusion (Cohen & Nagel, 1934, p. 275). In the second place, one can always fill in a general premise (e.g., "if fifty cows give milk, then the fifty-first cow will give milk") to make an induction deductive (Rescher, 1980, pp. 10-19). And thirdly, some deductions validly generate probable conclusions. For instance, "if his baby is crying, he is probably irritated; his baby is crying; so he is probably irritated." True, this conclusion is structurally guaranteed, but it has the same semantic and pragmatic functions as the supposedly non-entailed conclusion of an induction.

The third deficient distinction is one recently proposed by Freeman (1983). He tells deductive and inductive arguments apart on the basis of prima facie indicators. These indicators are words or phrases which express the degree to which the conclusion is required by the premises. Thus, "it

necessarily follows that" indexes a deductive argument, while "it is probable that" is appropriate for inductive arguments. These indicators may be implicit (i.e., unstated but understood); however, explicit indicators are to be given preference in uncertain cases. Freeman himself admits that the indicators approach does not always give a clear decision. Englebretsen (1984), however, in pointing out that these indicators may well be misused by actual arguers, does even more serious damage to Freeman's procedure. In answer to Englebretsen, Freeman (1984) can only answer that Englebretsen's examples can be properly classified by falling back on family resemblance to correct deductive or inductive arguments. Since this answer presupposes that there <u>is</u> a clear distinction between deductive and inductive arguments, but does not specify or defend it, we will have to look elsewhere for our own criteria.

In sum, neither the traditional distinctions--those based on particular or universal premises, or probable versus certain conclusions--nor a more recent effort which depends on semantic clues, unequivocally tell induction from deduction. Clearly, therefore, Ziegelmueller and Dause were obliged to develop another criterion in order to make induction and deduction a key part of their theory of argument.

<u>Ziegelmueller and Dause: Summary</u>

Ziegelmueller and Dause say that all arguments have three components: data, reasoning process, and conclusion (p. 85). The data may be perceptual premises, value premises, or expert opinion (pp. 86-87; see ch. 4). Conclusions are classified into three categories as well: conclusions of existence, of essence, and of explanation (pp. 86-87). The reasoning

process may be either inductive or deductive (pp. 88-92). Induction includes argument by example, by analogy, and by causal correlation, while deductive arguments are from sign or causal generalization (ch. 7).

In defining induction, they reject the "specific premise to general conclusion" distinction because (a) it fails to specify the reasoning process involved, and (b) as we noted above, counter-examples are available (p. 88). Their own definition specifies synthesis as the characteristic reasoning process for induction: "Properly conceived, inductive reasoning may be thought of as the synthetic process used in moving from particulars to probable conclusions" (p. 88, italics omitted). They single out three features of this definition for further discussion: synthesis is "bringing together of elements into a whole" (p. 89), induction begins with particulars ("specific cases, instances, or situations") (p. 89), and it generates probable conclusions. They claim in regard to this last item that "even if the absolute validity of the initial data could be established, the form of inductive reasoning does not allow for structural certainty" (p. 89).

In defining deduction, Ziegelmueller and Dause object to the "general premise to specific conclusion" criterion not only because it may be wrong, as reviewed in the previous section, but also because it does not specify the reasoning process characteristic of deductive argument. Here is their definition: "Properly conceived, deductive reasoning may be thought of as the analytic process used in moving from generalities to structurally certain conclusions" (p. 90, italics omitted). They elaborate on three of these terms. Analytic reasoning is distinguished from the synthesis of

induction. Analysis involves the "breaking down of a whole into its parts" (p. 90). It applies established insights, avoiding the inferential leaps characteristic of induction. Deduction "begins with" generalities, not the particulars which provide induction's premises. These generalities must be universal. Lastly, deduction generates structurally certain conclusions; this certainty is guaranteed by the form of the argument.

Both deduction and induction have their places; neither is superior to the other (p. 91). Induction may provide the generalizations used in deductive arguments, but authority might also supply them (p. 92).

The most notable element of Ziegelmueller and Dause' treatment is the insistence on attention to the reasoning processes of synthesis and analysis. The other main features of their definitions--particular v. general starting point, and probable v. certain conclusions--are quite similar to some of the failed criteria discussed in the previous section. Their main hope for an unambiguous distinction, therefore, lies in their attention to the psychology of the arguer.

Ziegelmueller and Dause: Criticisms

Let us begin, therefore, by considering the portions of Ziegelmueller and Dause' definitions which focus on the psychology of reasoning. Later, we will turn to the other features of the definitions.

As a starting point, we must recognize that the synthetic/analytic distinction is an empirical one, not a philosophical one. To say that people are reasoning in one way when dealing with deduction, and in another way when doing induction, requires experimental evidence for support. Ziegelmueller and Dause provide no such evidence. This is unsurprising in a

textbook, of course, and by itself does not really count against their claim.

What is particularly worrisome here, however, is that I cannot think how such empirical evidence could possibly be produced. Imagine a simple experiment designed to test the claim of deductive-analytic and inductive-synthetic equivalences. Subjects are presented with deductive and inductive arguments, and their reasoning processes are observed (never mind how this last is done). Subjects are, in fact, observed to reason analytically when presented with deductive arguments, and synthetically when working with inductive ones. Is the hypothesis supported? No. The fundamental difficulty with this design is the identification of the stimuli as deductive or inductive. If we cannot tell deduction apart from induction before the experiment begins, we cannot possibly say that one kind of reasoning is associated with deduction, and the other with induction. So their claim presupposes a definition, and does not supply one.

Suppose, however, that Ziegelmueller and Dause modify the design, and use paradigm cases of deduction and induction for stimuli. I will not dispute here that such cases can be unequivocally identified. Suppose further that their empirical claim about reasoning processes now receives perfect support from the experimental data. Is the hypothesis established now? No. Even if people reason analytically with paradigm cases of deduction, this does not prove that they reason analytically with all deduction. And similarly for induction. Ziegelmueller and Dause have committed themselves to a definition, which must be true for all cases. Even if we make the unlikely assumption that the paradigm case experiment would produce perfect evidence (i.e., no exceptions to the hypothesis), we

cannot allow a definition to be based on an intentionally unrepresentative sample of deductions and inductions. So even if Ziegelmueller and Dause can find some clear examples of deduction and induction, they still cannot sustain their claim.

In short, the equivalences between deduction and analysis and between induction and synthesis are empirical claims which cannot be tested without prior definitions of deduction and induction. Their comments about analysis and synthesis, therefore, are not definitional. They are at best descriptive, and perhaps not even that.

The criticism so far has presumed that the analysis/synthesis distinction is itself unambiguous. However, I find some difficulty here as well. In their elaborations of these terms, Ziegelmueller and Dause say that synthesis moves from particular premises to some sort of pattern or whole, while analysis divides a whole into its parts. This seems to be only a disguised way of saying that synthesis (i.e., induction) moves from particulars to universals, while analysis (i.e., deduction) moves from universals to particulars. As we saw in the previous section, this distinction is untenable. And even in Ziegelmueller and Dause' treatment, some questions arise. One of their examples of induction, for instance, involves concluding that a fifty-first cow will give milk because fifty others did. Where is the synthesis here? If there is a pattern (perhaps "all cows give milk"—but see the discussion of unexpressed premises below), it is certainly not stated in the conclusion, as the definition seems to require. As for the possibility of analysis breaking down a whole into parts, Cohen (1944, pp. 19-20) mentions a deadly counter example: a

deductive argument in geometry with premises about triangles and a conclusion about polygons. Here, the "deductive analysis" actually generalizes. In terms of definitional clarity, the analysis/synthesis distinction does not seem to be an improvement over deduction/induction.

In sum, Ziegelmueller and Dause' effort to distinguish induction from deduction on grounds of reasoning processes is unsatisfactory. Their treatment presupposes unequivocal definitions of induction, deduction, analysis, and synthesis; such definitions have not yet appeared. Let us turn, therefore, to the other features of Ziegelmueller and Dause' definitions, in the hope that clear criteria may be found there.

They say that deduction begins with generalities and induction begins with particulars. I find, however, ambiguities surrounding "begins," "particulars," and "generalities." Let us take "begin" first.

A standard example of deduction is "all men are mortal; Socrates is a man; so Socrates is mortal." In this mode of expression, we can all see that the argument "begins" with the general proposition that all men are mortal. But this, too, is a deduction: "Socrates is a man; all men are mortal; so Socrates is mortal." In fact, it is the same deduction. However, this one "begins" with the particular proposition that Socrates is a man. The deduction is indifferent to which of the two premises is first. As long as an argument has both a particular and a universal premise, how can one possibly say--as a defining feature--with which the argument "begins?"

Induction poses a similar problem. As we noted in a previous section, any induction can be "filled out" enthymematically with a premise which makes it deductive. For instance,

Cow 1 gives milk;

Cow 2 gives milk;

.
.
.

Cow 50 gives milk;

<If cows 1 through 50 give milk, cow 51 will give milk;>

So, cow 51 gives milk.

This is basically Ziegelmueller and Dause' example, with a premise filled in to complete the argument deductively (see Cohen & Nagel, 1934, p. 276; Rescher, 1980, pp. 10-19; van Eemeren & Grootendorst, 1983b, pp. 219-220; 1982, pp. 99-100; Freeman, 1984, pp. 39-40, for discussions of unexpressed premises). Here, should we say that the argument begins with one of the first fifty explicit premises, or with the supplied general premise? As with more obvious cases of deduction, the "beginning" is completely arbitrary.

The idea of particulars and generalities is also somewhat ambiguous. As Cohen (1944, pp. 19-20) notices, "particulars" are already abstracted before they enter an argument. The premises about cows, for instance, ignored all the features which distinguish one cow from another. No objective way suggests itself for identifying some nouns as particulars and others as generalities. These are only relative terms--relative to each other. We can say that one noun is more particular or general than another, but cannot say that something is, simply, particular or general. This obvious point is worth belaboring because Ziegelmueller and Dause have only one term apiece in their definitions. Induction does not move from particulars to generalities, it moves from particulars to probable

conclusions. And deduction does not move from generalities to particulars, it goes from generalities to structurally certain conclusions. This, no doubt, represents an effort to avoid the discredited particular-to-general and general-to-particular criteria, but in dodging this distinction, Ziegelmueller and Dause have made meaningless what they retained of it.

In short, the portions of the definitions which focus on the starting points of argument are no more successful than the segments dealing with reasoning processes. Many, if not most, arguments have both particular and general premises available to them, and this makes the so-called starting point arbitrary and definitionally useless. Worse, Ziegelmueller and Dause lack the contrasts required even to identify something as particular or general. So let us turn finally to the last main possibility for a distinction: probable versus structurally certain conclusions.

As we noticed in an earlier section, this distinction has some serious difficulties, even though it is proposed by the standard textbook as a primary way of telling induction from deduction (Copi, 1972, p. 26; also see Cohen & Nagel, 1934, p. 272). The claim that inductions (except perfect ones) have probable conclusions while deductions have necessary ones is, of course, based solely on textual form. In addition to the objections registered earlier in this paper, let us now consider a particularly rhetorical one: the enthymeme. Consider the argument, "Socrates is a man, so Socrates is mortal." Because of our familiarity with the example, we want immediately to fill in the missing premise: "all men are mortal." This makes the argument deductive, and the conclusion structurally necessary. But not so fast: we could just as plausibly fill in, "my grandfather died; his father died; his father died;" and so forth. Such a sequence of

premises makes the argument inductive, and the conclusion only probable. We can, in principle, fill out virtually any enthymeme either deductively or inductively, if the enthymeme is missing an explicit premise (see Freeman, 1984, pp. 39-40). Therefore, no theory of probability and certainty which requires knowledge of the argument's complete form is of any possible utility to rhetoricians. Since Ziegelmueller and Dause wish to describe all arguments, not merely explicit textbook examples, their probable/certain distinction is of no help (even if the earlier objections about probability and certainty were not fatal, which I think they are).

These criticisms do not leave us very hopeful about Ziegelmueller and Dause' effort to distinguish induction from deduction. My arguments may prove to be answerable, of course, but my present conclusion is that Ziegelmueller and Dause' definitions are unsatisfactory.

Recommendations

If we find ourselves unable to distinguish induction from deduction, what approaches to the study of argument remain open to us? In closing, let me discuss some of the possibilities.

The first is to eliminate the supposed distinction, and treat all arguments as deductive. So-called inductive arguments can be "filled in" with hypothetical premises (e.g., "if X is true of six instances, X is true of all"). This usefully draws attention to the general premise unexpressed in apparently inductive arguments; the strengths and weaknesses of "inductive" arguments usually have quite a lot to do with these implicit premises. This approach might be elaborated by means of Toulmin's (1958) distinction between warrant-using and warrant-establishing arguments; this

notion might satisfy Ziegelmueller and Dause' wish to discuss particular and general premises and claims. However, for this first alternative, we should note that supplying premises is problematic, since we rarely have reliable clues as to which of several possible unexpressed premises is most appropriate (Freeman, 1984, pp. 39-40; van Eemeren & Grootendorst, 1982; 1983b).

The second possiblity which comes to mind is to abandon the terms induction and deduction, and proceed to some theory of argument which does not appear to depend on them. Possible candidates are Toulmin (1958), Perelman and Olbrects-Tyteca (1969), van Eemeren and Grootendorst (1983a), and Willard's (1980) description of personal construct inferences. No doubt this list is incomplete. Ziegelmueller and Dause' data-reasoning-conclusion model, in fact, might turn out to be an alternative itself, assuming that they could describe reasoning in new terms. Another variant of this alternative is simply to list and discuss the various kinds of argument: in Ziegelmueller and Dause (1975), the types are example, analogy, causal correlation, sign, and causal generalization (in truth, I do not see what the induction/deduction distinction really adds to the present discussions of these kinds of argument, anyway).

A third possibility which might prove productive is to move away from normative models of any kind, and use empirical descriptions of arguments. We are beginning to generate a respectable body of literature which describes people's arguing behaviors; perhaps argument can simply be described rather than defined. The main difficulty with this alternative is that I am not sure we presently have enough research of this kind.

The last possibility which occurs to me is to try to rescue the induction/deduction distinction. I am dubious about our chances of success in this endeavor, but I am sure some will attempt it. Even if unsuccessful, they will at least be in good company.

Footnote

[1]I am quite sensitive in writing this paper that many of my criticisms, whether of traditional induction/deduction distinctions or of Ziegelmueller and Dause', presume that I know the difference between induction and deduction. However, I have no such criteria to offer. Instead, I can only ground these criticisms in (a) my recognition of what deduction and induction are supposed to look like, based on various textbooks' presentations of paradigm cases of explicitly-labeled deductions and inductions, and (b) my right to test the various distinctions' internal consistency and coherence.

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